

LOCH LOMOND: A NATURAL HISTORY AND A SCIENTIFIC STUDY

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After graduating from the University of Glasgow in 2004 with a degree in Zoology, I undertook a Masters in Biological Photography and Imaging at the University of Nottingham. As part of the MSc. I was required to complete a dissertation composed of photographs, illustrations and text. I was delighted to be offered the chance to carry out the work for my dissertation at Glasgow University Field Station, on Loch Lomondside, with Dr. Kate Arnold and Stephen Larcombe (University of Glasgow). My task was to photographically document their research into the effects of dietary antioxidants on blue tit nestlings. As well as photographing their experimental methods and techniques, I captured images of the area surrounding the field station in order to build up a picture of the working environment of scientists who are based there. A selection of these images illustrates this short paper.

GLASGOW UNIVERSITY FIELD STATION, LOCH LOMOND

Glasgow University field station was built in 1966, and is situated on the east side of Loch Lomond within the Loch Lomond and the Trossachs National Park. Its remote situation and close proximity to the city of Glasgow makes it a perfect base for scientific fieldwork. Over the years, nearly four hundred nest boxes have been put up in the woods that surround the field station (Ramsay, 2005). Almost all of these are inhabited each year by blue tits, great tits, redstarts or pied flycatchers. Blue tits (*Parus caeruleus*) are the most common inhabitants of the nest-boxes, and are frequently used in experiments because of their abundance and their high resilience to human disturbance (Fig. 1). Various non-invasive experiments have been carried out on the blue-tit population during recent years, most of which looked at the behaviour and ecology of the species. One such study was carried out at the field station in summer 2005 by Dr. Kate Arnold and Stephen Larcombe.

The aim of their experiment was to examine how dietary antioxidants, specifically vitamin E and carotenoids, affect blue tit nestlings as they grow. Studies have shown that the yellow chest and crown plumage of the blue tit plays an important role in mate selection by both sexes, brighter birds being preferred by potential mates (Senar *et al.*, 2002). The reason for this preference is unclear; however, there is evidence that the colour is used as a signal of a bird's quality (Hill, 1991). The yellow colour of the feathers derives from a class of compound called carotenoids: pigments, which have antioxidative properties (Partali, 1987). This has led to the theory that the brightness of the chest and crown plumage may be indicative of a bird's internal antioxidant status (Olson and Owens, 1998).

Arnold and Larcombe designed an experiment to test whether or not carotenoids are used as antioxidants, and whether yellow plumage is a signal of an individual's internal antioxidant status, and thus quality. To answer these questions blue tit nestlings were supplemented with

carotenoids, vitamin E and a control treatment to test how each affected the plumage brightness and internal oxidative stress levels (Fig. 2). Work is now being carried out in the Glasgow University laboratories to analyze the data collected during the field season, thus no conclusive results are available at this time.

During my time at the field station I was able to follow the research team and photograph various experimental techniques and blue tit behaviours e.g. chick begging behaviour, foraging and incubation (Fig. 3). I photographed the chicks daily, and built up a sequence of photographs documenting their growth patterns, specifically belly feather growth and wing development (Fig. 4).

The research team members were keen naturalists with extensive knowledge of the surrounding area. I was therefore able to glean a great deal of information about the flora and fauna in the vicinity. For example, several bird species, including redstarts (*Phoenicurus phoenicurus*), willow warblers (*Phylloscopus trochilus*), woodcock (*Scolopax rusticola*), pied flycatchers (*Ficedula hypoleuca*), great tits (*Parus major*) and blue tits (*Parus caeruleus*), were seen nesting in the area (Fig. 5). This allowed me to set up a hide a short distance from the nests so that I could photograph these birds in their natural environment without causing any undue disturbance.

THE LOCH LOMOND AND THE TROSSACHS NATIONAL PARK

The Loch Lomond and the Trossachs National Park encompasses fresh water lochs, ancient woodlands, wild glens and vast mountain ranges, and has delighted artists, writers and naturalists for years (Fig. 6). The spectacular landscape is home to a wide variety of flora and fauna, which attract visitors from all over the world, thus making it extremely important for conservation, tourism and scientific study within Scotland.

The national park offers a stronghold for many nationally and internationally important species. Two species that are considered iconic to the park are the red squirrel (*Sciurus vulgaris*) and the capercaillie (*Tetrao urogallus*), both of which are listed as priority species for conservation efforts within the UK.

Loch Lomond itself has more species of freshwater fish than any other Scottish loch (Maitland and Adams, 2005). Amongst them is the powan (*Coregonus lavaretus*), a rare species that is found in only one other loch in Scotland (Scott, 1998). In a recent survey of national nature reserves within the UK, Loch Lomond was identified as being of outstanding importance for fish (Lyle and Maitland, 1994). Loch lomondside, the area surrounding the loch, is a veritable paradise for botanists, with a quarter of the UK's 2,000 flowering plants and ferns found there (Tippett, 1974).



Figure 1 Adult blue tit



Figure 2 Feeding a chick with an experimental treatment



Figure 3 Blue tit nestling begging behaviour



Figure 4 Blue tit nestling bellies, 6-14 days after hatching, showing development of feather patterns and coloration



Figure 6 Loch Lomond at dusk



Figure 5 Redstart female, about to feed her you

This botanical species richness stems from the geographical position and the topographical variety of the land (Tippett, 1974).

There are over 200 species of bird found on and around Loch Lomond, making it a haven for birdwatchers and ornithologists. Although mostly elusive, a large assortment of mammals inhabits Loch Lomondside, some of which are deemed endangered within the UK. For example, the Scottish wildcat (*Felis sylvestris grampia*), which is the UK's only surviving native cat. Being nocturnal and extremely shy, the wildcat is very rarely seen: however, populations are known to exist within the national park. Another common but rarely seen mammal is the otter (*Lutra lutra*) (McCafferty, 2005).

A multitude of factors makes the Loch Lomond and the Trossachs National Park of vital importance to Scotland. The richness of flora and fauna in the area, along with its outstanding natural beauty, makes it well deserved of its status as a national park. As long as this status is upheld and respected by this and future generations, people will be granted the opportunity to experience for themselves the delights that the area has to offer for years to come.

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